



A review of *Hippeutister* Reichensperger with new species from California and Costa Rica (Coleoptera: Histeridae: Hetaeriinae)

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Abstract

The myrmecophilous genus *Hippeutister* Reichensperger, 1935, contains six species, known from scattered localities in North, Central and South America. Two of these, *H. californicus* n. sp. and *H. solisi* n. sp. are newly described herein. The other four are *H. manicatus* (Lewis) (= *H. solenopsidis* Reichensperger, syn. nov.), *H. plaumanni* Reichensperger, *H. castaneus* (Lewis), and *H. amabilis* (Wenzel). The genus is likely monophyletic, and is easily recognized by the presence of a very broad prosternal keel, which is deeply triangularly incised at the base. Species of *Hippeutister* are unusual among hetaeriine Histeridae in their occurrence in the nests of fire ants (*Solenopsis* spp.).

Key words: fire ants, myrmecophily, inquiline, Coleoptera, Histeridae

Introduction

Reichensperger (1935) described the hetaeriine genus *Hippeutister* to accommodate a new species from the nests of *Solenopsis* Westwood ants in Costa Rica, *H. solenopsidis*. He characterized this genus as 'a more dorsally convex and narrower *Nymphister* Reichensperger, ... but possessing completely different sternal and leg structure alongside with other specializations ... so being relatively isolated within the Hetaeriomorphini' (translation from German by the junior author). He added a second species the following year, *H. plaumanni* (Reichensperger, 1936), erroneously considered originally to be males of *H. solenopsidis* (Reichensperger, 1935). Wenzel (1938) described the genus *Solenopsister* for the new species *S. amabilis*, and this genus was synonymized with *Hippeutister* by Blackwelder (1944), with no explanation. Fifty years later, Mazur (1997) moved two species of *Paratropus* Gerstaecker (now *Exosternini*) to *Hippeutister*, *H. manicatus* (Lewis) and *H. castaneus* (Lewis), similarly without explanation (aside from the obvious fact that *Paratropus* was no longer considered a member of the subfamily Hetaeriinae). *Hippeutister* presently comprises five valid species, distributed through the Neotropics, from Brazil to Mexico. The discovery of an undescribed species in southern California, through the senior author's California Beetle Project, prompted a reassessment of the scope of the genus and a brief review of the recognition characters and distributions of the species included.

In their review of the classification and relationships of Hetaeriinae, Helava *et al.* (1985) placed *Hippeutister* in their group 'E1', with close relationships to *Plagioscelis* Bickhard and *Hemicolonides* Lewis (listed originally as *Ponerolister* Bruch and *Ouadimosister* Helava, see discussion in Dégallier 1998 a, b). The main diagnostic characters listed for the genus were the presence of interrupted epistomal carinae, with the lateral margins of the head longitudinally depressed, a broad flat prosternal keel, which is deeply emarginate posteri-

only, and a lack of elytral striae. None were explicitly designated as synapomorphies, and several are shared with other Hetaeriinae. In fact one of the most distinctive features of *Hippeutister* is revealed by the name of the type species and of Wenzel's synonymous genus, an obligate association with ants in the genus *Solenopsis* (fire ants). While practically all Hetaeriinae are obligate myrmecophiles, only two other genera (out of approximately 100) have been recorded in the nests of *Solenopsis*, *Procolonides* Reichensperger and *Teratosoma* Lewis (although this last may be erroneous, as the record comes from a colony being raided by *Neivamyrmex* Borgmeier, and it has been otherwise recorded from *Neivamyrmex* as well; Bruch, 1926), and these are only distantly related to *Hippeutister* (Helava, 1985; Caterino & Tishechkin, unpub. data). All other 'group E' (sensu Helava *et al.*, 1985) genera are reported only to occur in army ant colonies (Ecitoninae), though it should be noted that no host records are available for *Plagioscelis* Bickhardt, the most similar of these. So in addition to morphological characters discussed by Helava *et al.* (1985), and below, host association can be considered strong evidence uniting at least 4 of the now 6 known species of *Hippeutister*.

Materials and methods

This study is based on specimens from the Santa Barbara Museum of Natural History (SBMNH), The Natural History Museum, London (BMNH), Zoologische Institut und Forschungsmuseum Alexander König, Bonn (FIMAK), the Instituto Nacional de Biodiversidad, San Jose, Costa Rica (INBIO), and private collection of P. W. Kovarik, Columbus, OH (PWK). Body part measurements were made of all available specimens, represent averages of available measurements, are grouped at the beginning of each description (or diagnosis if no description is presented) to facilitate comparisons, and are abbreviated as follows: L (mm—dorsal length along midline from anterior pronotal margin to posterior elytral margin); W (mm—width at widest point); E/PnL (ratio—elytral length/pronotal length); E/PnW (ratio—elytral width/pronotal width); Pn W/L (ratio—pronotum width/length); E L/W (ratio—elytra length/width); Pr/Py (ratio—propygidium length/pygidium length); Sterna—pro, meso, meta (mm—lengths along midline); Tibiae—pro, meso, meta (mm—straight line length from base to apex, ignoring curvature).

Key to the species of *Hippeutister*

- 1 Elytral disc bearing setae (Figs. 1A, 1C, 4A, 4C)2
- Elytral disc glabrous; epipleura may be setose3
- 2 Setae of elytron (in part) clearly marking the basal portions of elytral striae 1–3 as well as sutural stria, otherwise evenly distributed (Figs. 1C, 4C); dorsal setae borne in elevated pustules, somewhat flattened, faintly scale-like (Figs. 4C, 5C)..... *H. castaneus* (Lewis)
- Setae of elytron more randomly scattered, not obviously marking any elytral striae, and denser in posterior half (Figs. 1A, 4A); setal bases not elevated, setae finer, not at all scale-like.....*H. californicus* **n. sp.**
- 3 Elytral epipleuron and lateral pronotal margin bearing dense rows of setae (Figs. 5B, 8B) *H. solisi* **n. sp.**
- Elytral epipleuron and lateral pronotal margin glabrous4
- 4 Body moderately convex (Figs. 8A–C); elytron with sutural stria marked by row of distinctly larger punctures; pronotum with few or no superficial wrinkles on surface
.....*H. plaumanni* Reichensperger and *H. amabilis* (Wenzel)
- Body strongly convex (Fig. 8D); elytron densely punctate, but punctures in area of sutural stria not standing out; pronotum with distinct transverse to oblique wrinkles in anterior corners (Fig. 5D)
.....*H. manicatus* (Lewis)

Hippeutister Reichensperger, 1935

Solenopsister Wenzel, 1938: 318; Blackwelder, 1944: 186. Type species: *Solenopsister amabilis*.

Type species: *Hippeutister solenopsidis* Reichensperger, 1935: 208 (= *H. manicatus* Lewis), by monotypy.

Diagnosis: *Hippeutister* is easily recognizable among Hetaeriinae, and almost undoubtedly monophyletic. It is most easily recognized by the broad, weakly convex prosternum with strongly divergent carinal striae, its deeply, triangularly emarginate prosternal keel, and by the correspondingly broad mesosternal projection (Fig. 6). A number of other features are more unusual among neotropical Hetaeriinae, and are also useful in recognizing members of *Hippeutister*. They have a cylindrical, obliquely truncate antennal club (Fig. 3B), the frons is longitudinally depressed along inner edge of eye, resulting in a distinct ocular carina (Fig. 7), the prosternum has an extra, third pair of carinal striae (Fig. 6), the pronotum exhibits oblique depressions extending forward from posterior corners (Figs. 4, 5), the elytra lack striae (though they may be weakly marked by punctures or setae), and the dorsum of the elytra is margined by a strong epipleural carina (Figs. 4, 8). It is most similar to members of the genus *Ponerolister* Bruch, which are identical in characters of the frontal carinae. The pro- and mesosternal characters of *Hippeutister* separate the two genera easily.

Hippeutister californicus Caterino & Tishechkin, n. sp.

(Figs. 1A, 2A, 3A, 3C, 4A, 5A, 6A–B, 7A, 8A)

Holotype of undetermined sex: "CA: San Diego Co., 32.7517°N, 116.6641°W, Cleveland NF, Horsethief Cyn., i.6.2005, M. Caterino"/"CA BEETLE PROJ, CBP0056475", SBMNH.

Diagnosis: Apart from its disjunct distribution, this species can be identified by the fine setae on most body surfaces, especially on the elytral dorsum (Figs. 1A, 4A, 8A). The only other species with dorsal (as opposed to epipleural) elytral setae is *H. castaneus*, in which they are coarse, fewer, and borne in prominent raised pustules (Fig. 4C). In most other characters it is very similar to the other new species, *H. solisi*, not only in discrete characters, but also in size (being smaller than the other species of the genus). *Hippeutister solisi* has much denser setae along the pronotal and epipleural margins. Some very slight differences in mesosternal striae of the two may be significant, but with only a single specimen of each known, may not be reliable.

Description: L: 2.46; W: 2.12; E/Pn L: 1.72; E/Pn W: 1.17; Pn W/L: 2.00; E L/W: 0.74; Pr/Py: 0.96; Sterna: 0.65, 0.25, 0.59; Tibiae: 0.69 0.69, 0.81 (n=1). Body rounded (Fig. 1A, 4A), moderately convex (Fig. 8A), narrowed anteriorly (Figs. 4A, 5A), pale rufescent and sparsely setose throughout. Frons (Fig. 7A) with longitudinal carinae parallel on epistoma, bent laterad, then obliquely over antennal insertions, ending freely before meeting ocular carina along inner margin of eye; both of these carinae bearing moderately dense row of short fine setae; frons flat to depressed at middle, and distinctly depressed along inner margin of eye, surface sparsely setose, each seta arising from a fine puncture; labrum flat, apical margin weakly emarginate, bearing numerous setae near apex; mandibles with numerous setae on sides; antenna with scape pyramidal, with all edges sharp, weakly produced, and bearing marginal setae; antennal club nearly cylindrical (Fig. 3B), slightly flattened, and obliquely truncate at the apex, the apical surface densely tomentose.

Prothoracic sides strongly convergent (Fig. 5A), weakly sinuate, with the anterior angles distinctly truncate; lateral margin bearing setae between elevated marginal and lateral striae; marginal stria not quite attaining base, extending around anterolateral corner, ending at anteromedian corner behind eye; lateral stria barely extending around basal corner, paralleling marginal stria, meeting it at anterolateral corner; anterior marginal stria present behind head, nearly meeting lateral marginal stria in anteromedial corner, replaced at middle behind head by a short, transverse striole; pronotal surface obliquely depressed on each side, glabrous, with scattered minute punctures, a few faint oblique wrinkles on each side, and several rather large but very shal-

low ocellate punctures, with their posterior edges effaced, in front of the scutellum. Prosternum broad, (Fig. 6A) with prosternal lobe strongly deflexed, its anterior margin striate at middle and bearing fine marginal setae; prosternum otherwise glabrous.

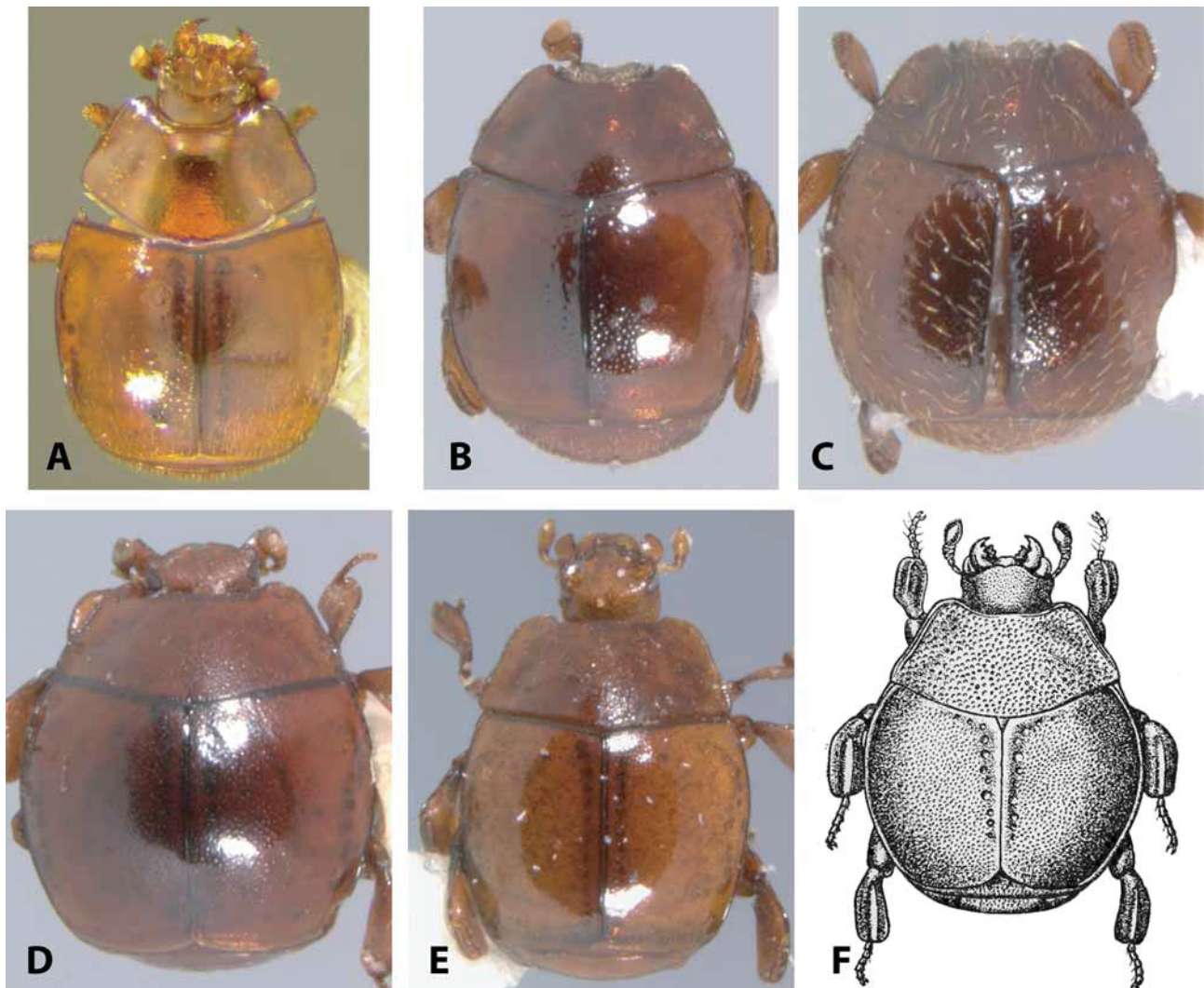


FIGURE 1. Dorsal habitus photographs and drawing. A. *Hippeutister californicus*, n. sp. B. *H. solisi* n. sp. C. *H. castaneus* (Lewis). D. *H. manicatus* (Lewis). E. *H. plaumanni* Reichensperger. F. *H. amabilis* (Wenzel) (scanned from original).

Scutellum distinct, shallowly longitudinally depressed; elytra convex, widest at middle, with setae sparsely scattered over entire surface, becoming more dense posteriorly (Fig. 4A), each seta suberect, directed posterad, short, very weakly flattened, arising from a shallow but fairly broad puncture; elytral striae not marked apart from three distinct epipleural carinae (Fig. 8A), one of which delimits the dorsal edge of the elytron and is complete from base to apex, the middle on the epipleural surface and also complete, and the outer-most extending from the humeral corner only about one third of the length of the epipleuron, where it meets the elytral margin.

Meso- and metasterna (Fig. 6B) with few fine setae laterally, depressed and coarsely punctate on and behind mesometasternal suture; mesosternal projection triangular, with fine marginal stria; two lateral metasternal striae present, one along anterior margin, one curving from anterior margin posterad along mesocoxa; metaventre with three oblique lateral striae, two arising behind inner corner of mesosternal projection, one extending laterad to mesocoxa, thence forming postmesocoxal stria, the other extending straight to metacoxa, the third arising from the first at the inner edge of the mesocoxa and ending freely in front of metacoxa. First

visible abdominal sternite with crenulate punctures along anterior margin, and two oblique postmetacoxal striae.

Femora of all legs short, broad and subquadrate, with scattered fine setae on outer surfaces, the meso- and metafemora bearing anterior marginal and submarginal striae; protibiae broad, parallel sided in apical two-thirds, with distinct marginal spines; meso- and metatibiae more rounded laterally, slightly narrowed to apex, lacking marginal spines, with complete marginal striae and bearing fine setae on outer face; tarsomeres 1–4 bearing pair of apicoventral setae; pretarsal claws straight.

Propygidium flat across base, weakly convex along apical margin, bearing striae along anterolateral margins, disc with fine setose punctures throughout; pygidium (Fig. 3C) smooth, convex, with fine setose punctures throughout.

Distribution: This species is only known from the type locality (Fig. 2A), in a hilly region covered with chaparral (shrubby sclerophyllous, xerophilous) vegetation, at about 2100ft elevation, just a few miles north of the Mexican border. This region of the California Floristic Province is rather unusual in receiving a significant portion of its annual precipitation during the summer months, possibly accounting for this more tropical genus's presence there. The type was collected on the underside of a rock with a colony of *Solenopsis amblychila* Wheeler during the early part of the winter rainy season. The type was collected in 2005 and the entire site burned in 2006 in the 'Horse Fire'. Attempts to recollect the species at the type locality in 2007 were unsuccessful, and no host ants were found.

Remarks: DNA has been extracted from the head and prothorax of the type specimen, and they are mounted on a separate point from the remainder of the body. This DNA resides in the SBMNH tissue collection under extract #MSC-1027.

***Hippeutister solisi* Caterino & Tishechkin, n. sp.**

(Figs. 1B, 2B, 3B, 3D, 4B, 5B, 6C, 7B, 8B)

Type material: Holotype female: “Cano Negro, 20m, R.N.V.S. Cano Negro, Prov. Alajuela, Costa Rica, 4 a 17 dic 1992, K. Flores, L-N 319100, 450200”/”INBIO CRI000911827”, INBIO.

Diagnosis: This species is most similar to the other new species, *H. californicus*, being only slightly larger in size, similar in body shape, and in being somewhat setose. This species is easily distinguished by lacking dorsal setae on the pronotum and elytra, but with dense setae on the margins (the epipleuron in the latter) of both (Fig. 8B).

Description: L: 2.83; W: 2.49; E/Pn L: 1.76; E/Pn W: 1.19; Pn W/L: 2.03; E L/W: 0.73; Pr/Py: 1.00; Sterna: 0.78, 0.28, 0.62; Tibiae: 0.72, 0.75, 0.84 (n=1). Body rufescent (Fig. 1B), moderately convex (Fig. 8B), rounded (Fig. 4B), widest just behind humeri. Frons (Fig. 7B) with about 40 fine setose punctures randomly scattered, these slightly more dense near vertex, and almost absent from epistoma; epistomal carinae well developed, sinuate over antennal bases, extending obliquely to ocular carina, both bearing denser fringe of setae; clypeolabral suture not evident; labrum truncate, bearing few discal and apical setae; mandibles finely setose on lateral surfaces.

Prothorax (Fig. 5B) widest at base, converging strongly and weakly sinuately to obliquely truncate anterior angles; pronotal marginal stria present, extending to anterior corner; lateral pronotal stria close to marginal, extending around anterior angle along anterior margin, interrupted briefly behind head where a short tangential discal stria replaces it; lateral margin of pronotum with short, dense fringe of setae between marginal and lateral striae; disc of pronotum obliquely depressed along sides, faintly explanate, glabrous, smooth, with faint, shallow but broad punctures in front of scutellum. Prosternal keel (Fig. 6C) broad, bearing a few setae; prosternal lobe short, not produced at middle, with moderately dense setose punctures near anterior margin.

Elytra convex, lacking dorsal striae (Fig. 4B), though with very faint oblique impressions near base, disc glabrous, with broad, shallow punctures near scutellum, and finer, denser ones extending posterad along suture; epipleuron margined dorsally by complete carinate stria and with less prominent subdorsal and lateral striae, the entire epipleuron finely setose, especially on and immediately below striae (Fig. 8B).

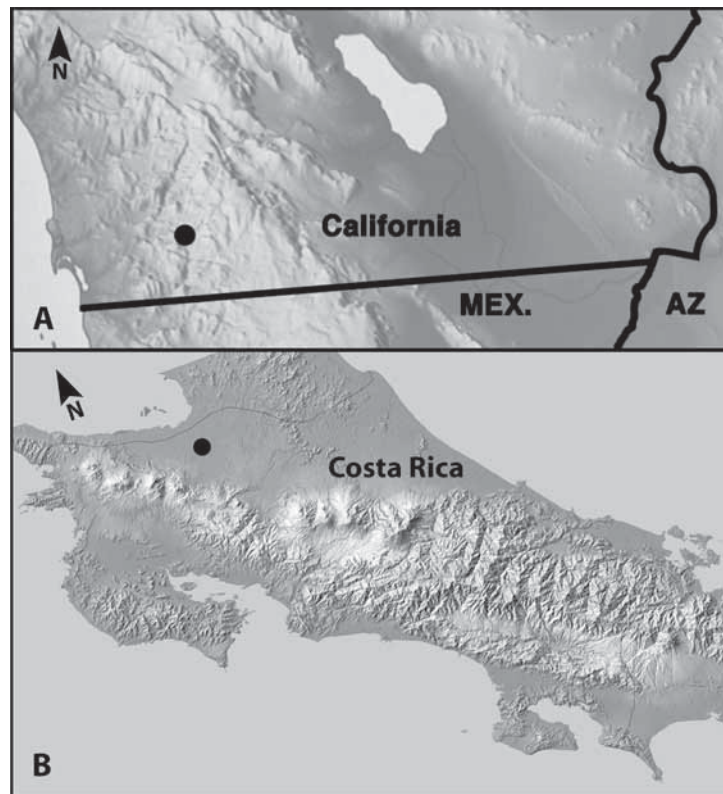


FIGURE 2. Type localities of the new species. A. *Hippeutister californicus*. B. *H. solisi*

Mesometasternal suture only faintly indicated at middle (Fig. 6C); mesosternum projecting strongly into triangularly incised base of prosternal keel, with fine marginal stria continuous with complicated array of several oblique lateral mesometasternal striae; metasternal disc with numerous rather deep setose pits anteromedially, becoming finer and sparser posteriorly; lateral portions of metasternal disc with more numerous but finer setose punctures lining and between the lateral striae. First visible abdominal sternite with sparse moderately deep setose pits particularly near anterior margin, with finer but denser setose punctures laterally, between and mediad the two oblique lateral striae.

Profemora (Fig. 8B) very broad, nearly square, margined along anterior and posterior edges, with setose punctures on ventral (posterior) face; protibia broad, rounded, subangulate near base, with series of fine spines along apical two-thirds of margin; meso- and metafemora short, with anterior and posterior margins rounded, with marginal and anterior submarginal striae on ventral (anterior) face, finely setose throughout; meso- and metatibiae more rounded laterally, slightly narrowed to apex, lacking marginal spines, with complete marginal striae and bearing fine setae on outer face; tarsomeres 1–4 bearing pair of apicoventral setae; pretarsal claws straight.

Propygidium flat to weakly impressed across base, notably convex along apical margin, bearing striae along anterolateral margins extending just around anterolateral corners, disc with fine setose punctures throughout; pygidium (Fig. 3D) faintly depressed along posterolateral margins, with fine setose punctures throughout.

Distribution: This species is only known from the type locality, in Alajuela province, north central Costa Rica (Fig. 2B). There is no host data associated with the specimen.

Remarks: We name this species for Angel Solís, of the Instituto Nacional de Biodiversidad in Costa Rica, in recognition of his efforts to advance knowledge and conservation of Costa Rican Coleoptera.

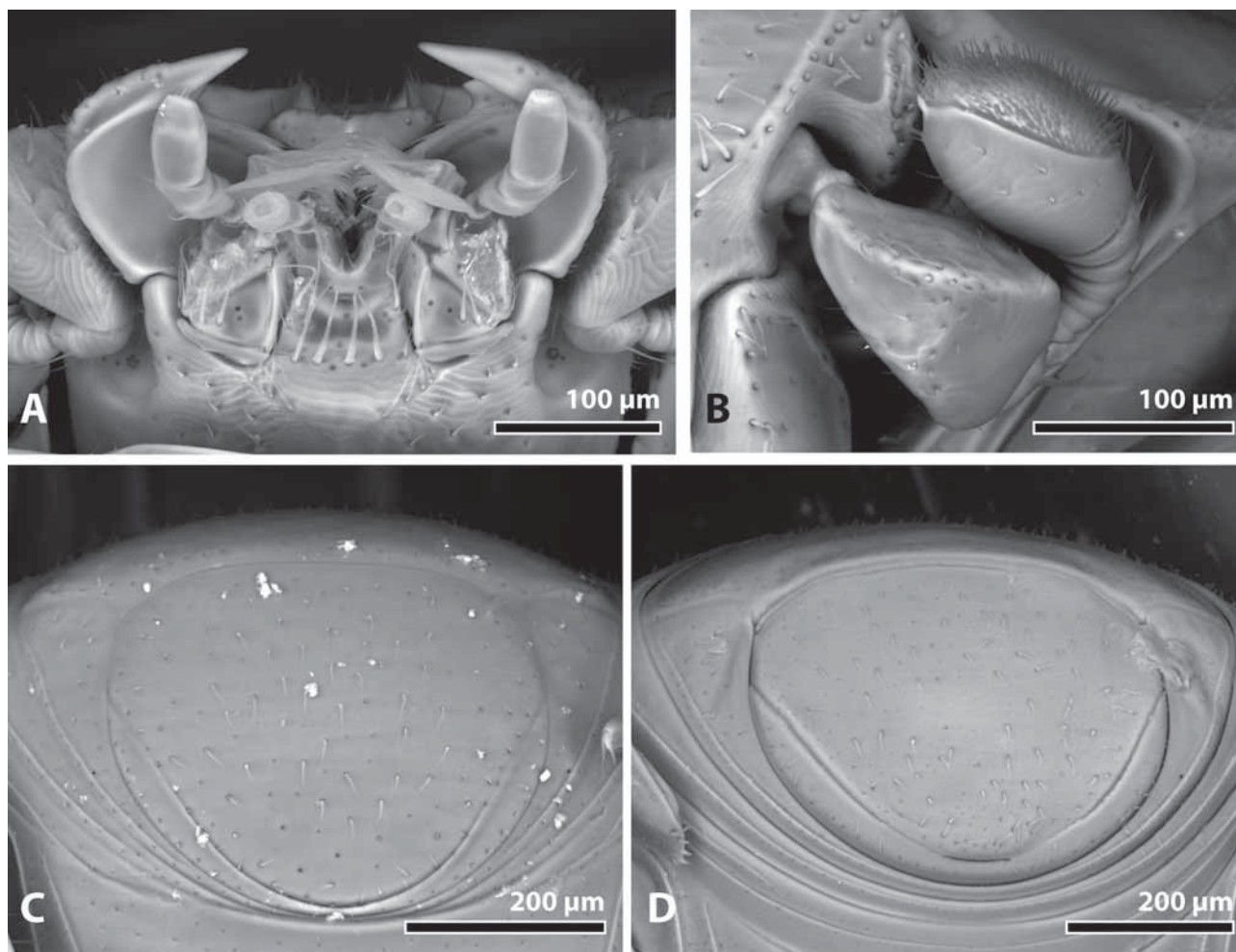


FIGURE 3. SEM photographs. A. mouthparts of *Hippeutister californicus*. B. Antenna of *H. solisi*. C. Pygidium of *H. californicus*. D. Pygidium of *H. solisi*.

***Hippeutister castaneus* (Lewis, 1891)**

(Figs. 1C, 4C, 5C, 6D–E, 7C, 8C)

Paratropus castaneus Lewis, 1891: 391. Lectotype, hereby designated: “Mexique”/ “G. Lewis Coll. B.M. 1926-369.”/ “Syntype”/ “Type”/ “*Paratropus castaneus* Lewis Type”/ “LECTOTYPE *Paratropus castaneus* Lewis M. Caterino & A. Tishechkin des. 2008”, BMNH; Paralectotype: “Mexique”/ “G. Lewis Coll. B.M. 1926-369.”/ “Syntype”/ “Type”/ “*Paratropus castaneus* Lewis Co-type”/ “PARALECTOTYPE *Paratropus castaneus* Lewis M. Caterino & A. Tishechkin des. 2008”, BMNH.

Diagnosis: L: 2.88; W: 2.62; E/Pn L: 1.68; E/Pn W: 1.19; Pn W/L: 2.04; E L/W: 0.69; Pr/Py: 0.97; Sterna: 0.84, 0.27, 0.70; Tibiae: 0.67, 0.80, 0.88 (n=3). This species is easily recognized by the unique setose ‘pus-tules’, enlarged, slightly raised pits bearing conspicuous, faintly scale-like setae. These are observed on essentially all body surfaces, but especially the frons, pronotum and elytra. In addition to being coarser, these setae are fewer and sparser than in the only other dorsally setose species, *H. californicus*.

Distribution: This species is known from the unspecified type locality in Mexico (Lewis, 1891), and from recent material from northwestern Belize. No specimens of the species have been associated with host

ants.

Material: one female (excluding type material) from Belize: Orange Walk District, Rio Bravo Conservation Area, 2nd Logging Rd. off main Rd. to Archeological Site, collected with flight intercept traps by P.W. Kovarik on July 18–20, 1996 (PWK).

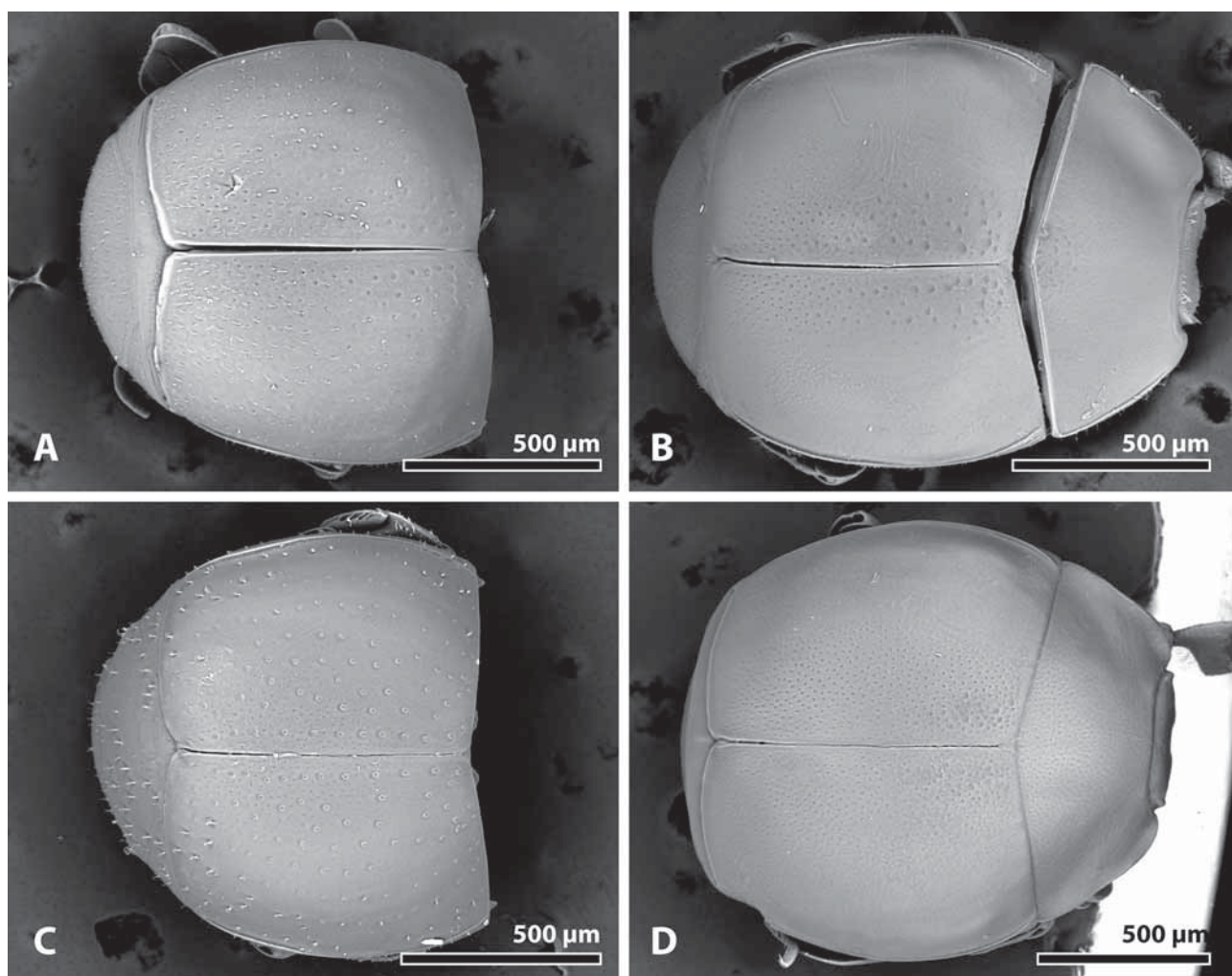


FIGURE 4. Dorsal SEM photographs showing elytra. A. *Hippeutister californicus*. B. *H. solisi*, C. *H. castaneus*. D. *H. manicatus*.

***Hippeutister manicatus* (Lewis, 1891)**

(Figs. 1D, 4D, 5D, 6F, 7D, 8D)

Paratropus manicatus Lewis, 1891: 390. Lectotype male, hereby designated: "Mexico, A.G."/"G. Lewis Coll., B.M.1926-369"/"Paratropus manicatus Lewis Type"/"Hippeutister manicatus (Lewis) nov. comb. 1988, N. Degallier"/"LECTOTYPE Paratropus manicatus Lewis M. Caterino & A. Tishechkin des. 2008", BMNH.

Hippeutister solenopsidis Reichensperger, 1935: 208. Lectotype, hereby designated: "La Caja, X.1934"/"LECTOTYPE Hippeutister solenopsidis Reichensperger M. Caterino & A. Tishechkin des. 2008", USNM. Paralectotype, hereby designated: "La Caja, X.1934"/"PARALECTOTYPE Hippeutister solenopsidis Reichensperger M. Caterino & A. Tishechkin des. 2008", USNM. **New Synonymy.**

Hippeutister manicatus; Mazur, 1997: 153.

Diagnosis: L: 2.94; W: 2.95; E/Pn L: 1.50; E/Pn W: 1.26; Pn W/L: 1.99; E L/W: 0.60; Pr/Py: 1.11; Sterna: 0.79, 0.26, 0.76; Tibiae: 0.80, 0.90, 1.03 (n=3). This is probably the most readily recognized species of

Hippeutister. It has a very distinctive body form, being very strongly convex dorsally (best seen in lateral view: Fig. 8D), and more broadly rounded (Fig. 4D) than any of the others. It is also the largest species of the genus, and is completely glabrous and thoroughly punctate, both dorsally (Fig. 4D) and ventrally (Fig. 6F). Its mesosternal projection is less strongly acute anteriorly, and the median-most pair of prosternal keel setae are strongly abbreviated from the base relative to most other species. In these last characters it is rather similar to *H. plaumanni*, from which it is nonetheless still easily separated by body shape alone.

Distribution: This species is known from the type locality ('Mexico'; Lewis, 1891), and from Costa Rica (three localities in the provinces Limon and San Jose). Although not mounted with the beetle, and therefore unconfirmed, the original description and FIMAK specimens of this species indicate they were collected with *Solenopsis geminata* (Fabricius). Reichensperger (1935) mentioned that H. Schmidt reported to him that he found type specimens either 'riding large soldiers of *Solenopsis*, or sitting quietly [in the colony].'

Material examined: 13 specimens (excluding type material) from Costa Rica; San Jose Province, Farm La Caja near San Jose, all collected by H. Schmidt: three in July 1936 (FMNH and USNM), one in October 1937 (USNM); San Jose Province, San Jose, all collected by H. Schmidt: five in September 1935 and four without date (all FIMAK); one from Limon Province, Hamburg Farm, collected on September 8, 1935 by F. Nevermann (USNM).

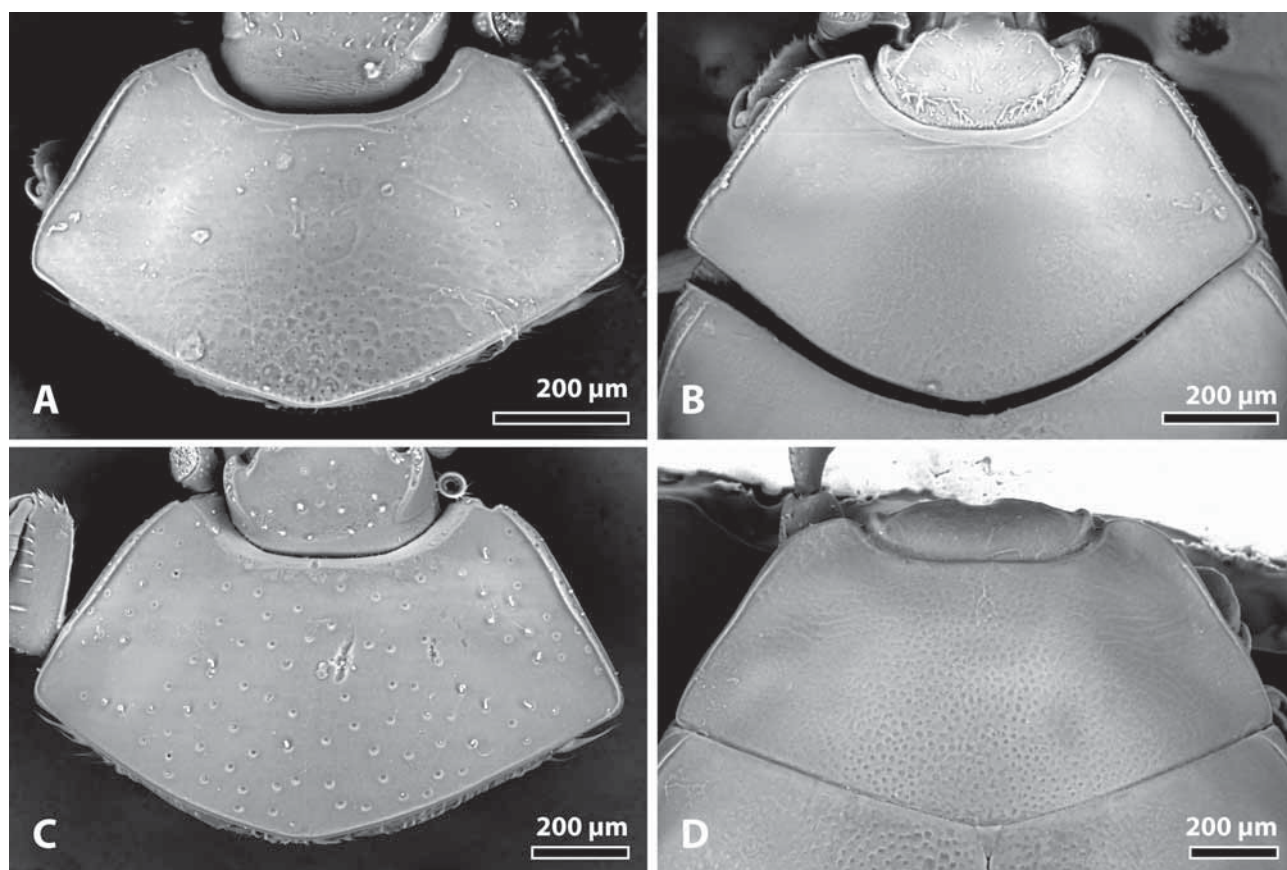


FIGURE 5. Dorsal SEM photographs showing pronota. A. *Hippeutister californicus*. B. *H. solisi*, C. *H. castaneus*. D. *H. manicatus*.

***Hippeutister plaumanni* Reichensperger, 1936**
(Figs. 1E, 6G)

Hippeutister plaumanni Reichensperger, 1936: 226. Lectotype female, hereby designated: "F. Plaumann, Nova Teutonia Brasilien, 7.35[July 1935]"/"Solenopsis saevissima"/"TYPUS"/"Hippeutister plaumanni Reichensp. "/"LECTO-

TYPE *Hippeutister plaumanni* Reichensperger M. Caterino & A. Tishechkin des. 2008", FIMAK; Paralectotype, probably female: same data as lectotype, FIMAK.

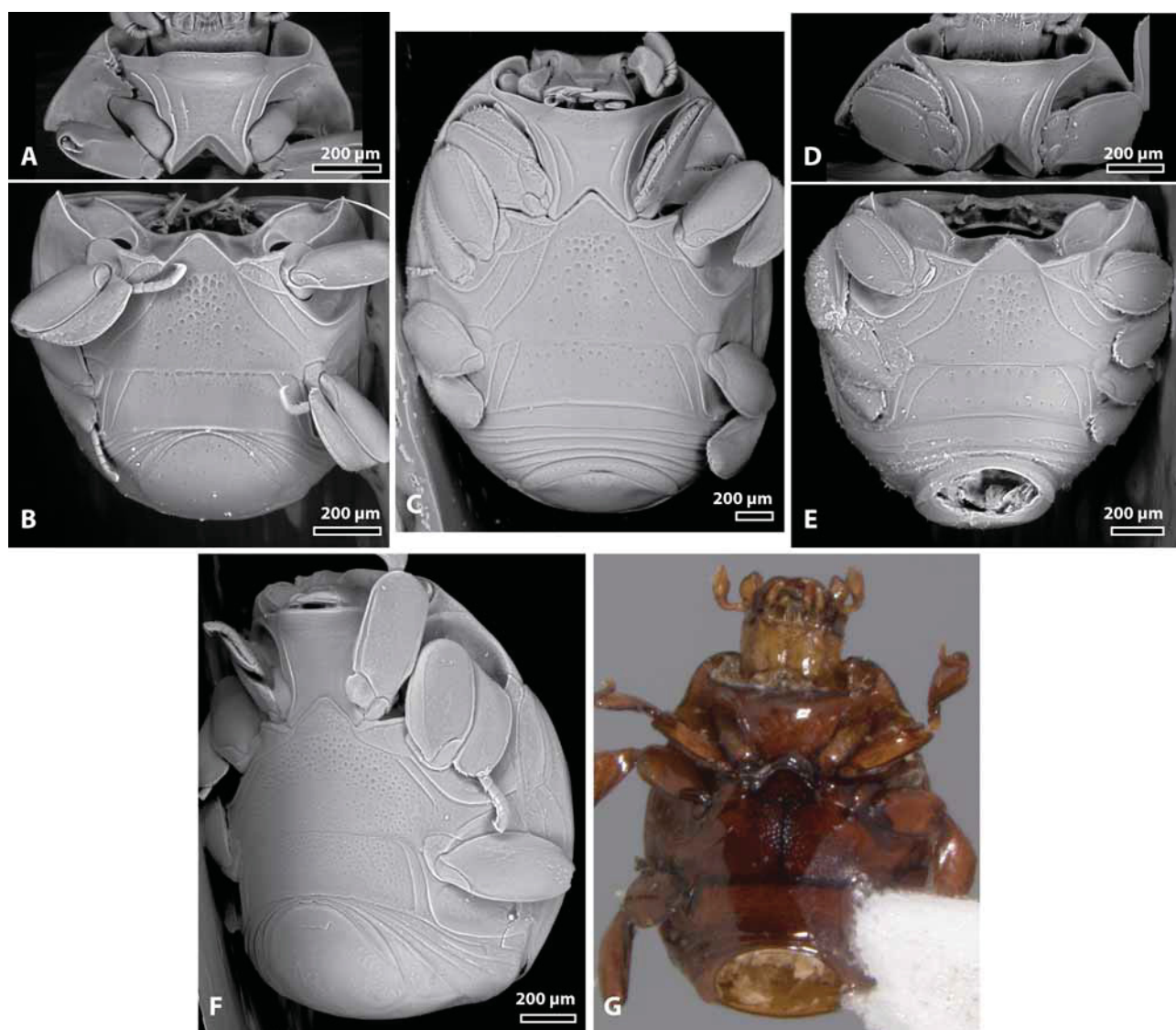


FIGURE 6. Ventral SEM photographs showing sterna. A, B. *Hippeutister californicus*. C. *H. solisi*, D, E. *H. castaneus*. F. *H. manicatus*. G. *H. plaumanni*.

Diagnosis: L: 2.74; W: 2.40; E/Pn L: 1.59; E/Pn W: 2.85; Pn W/L: 0.79; E L/W: 0.70; Pr/Py: 1.00; Sterna: 0.75, 0.28, 0.69; Tibiae: 0.72, 0.78, 0.87 (n=1). *H. plaumanni* and *H. amabilis* appear very similar, and as the latter is known from no extant specimens, a confident diagnosis separating these two is difficult to make. Both appear to be completely glabrous, like only *H. manicatus*, but they are much less strongly convex, and easily separated from it. The pronotum, elytra, frons and venter of *H. amabilis* are illustrated as densely though finely punctate, and are described as 'rather sparsely, finely punctate' (pronotum) or 'finely, rather shallowly, though not sparsely punctate' (elytra). Wenzel further describes the punctuation of the pronotum as 'finely ocellate' under high magnification, though he offers some disclaimer that the punctuation is 'not [...] quite so obvious on the sides of the pronotum [...] as shown in the figure'. In all cases, the punctuation of *H. plaumanni* is so fine as to be almost invisible, except in the shared vague depressions along the elytral suture, and small groups of conspicuous punctures along the median metasternal suture, and these differences are probably real and diagnostic. The mesoventrite of *H. plaumanni* is rather more bluntly than acutely triangular in front, and is strongly depressed (Fig. 6G). As in *H. manicatus*, the median-most pair of prosternal striae is strongly abbre-

viated from the base.

Distribution: This species is only known from topotypical material, from Nova Teutonia, in the state of Santa Catarina, Brazil as a guest of *Solenopsis saevissima* (Smith).

Material examined: five specimens (excluding type material), all collected by F. Plaumann in Nova Teutonia, one on July 30, 1952, one on August 3, 1952 (both FMNH), and two on August 9, 1953 (FMNH and USMN).

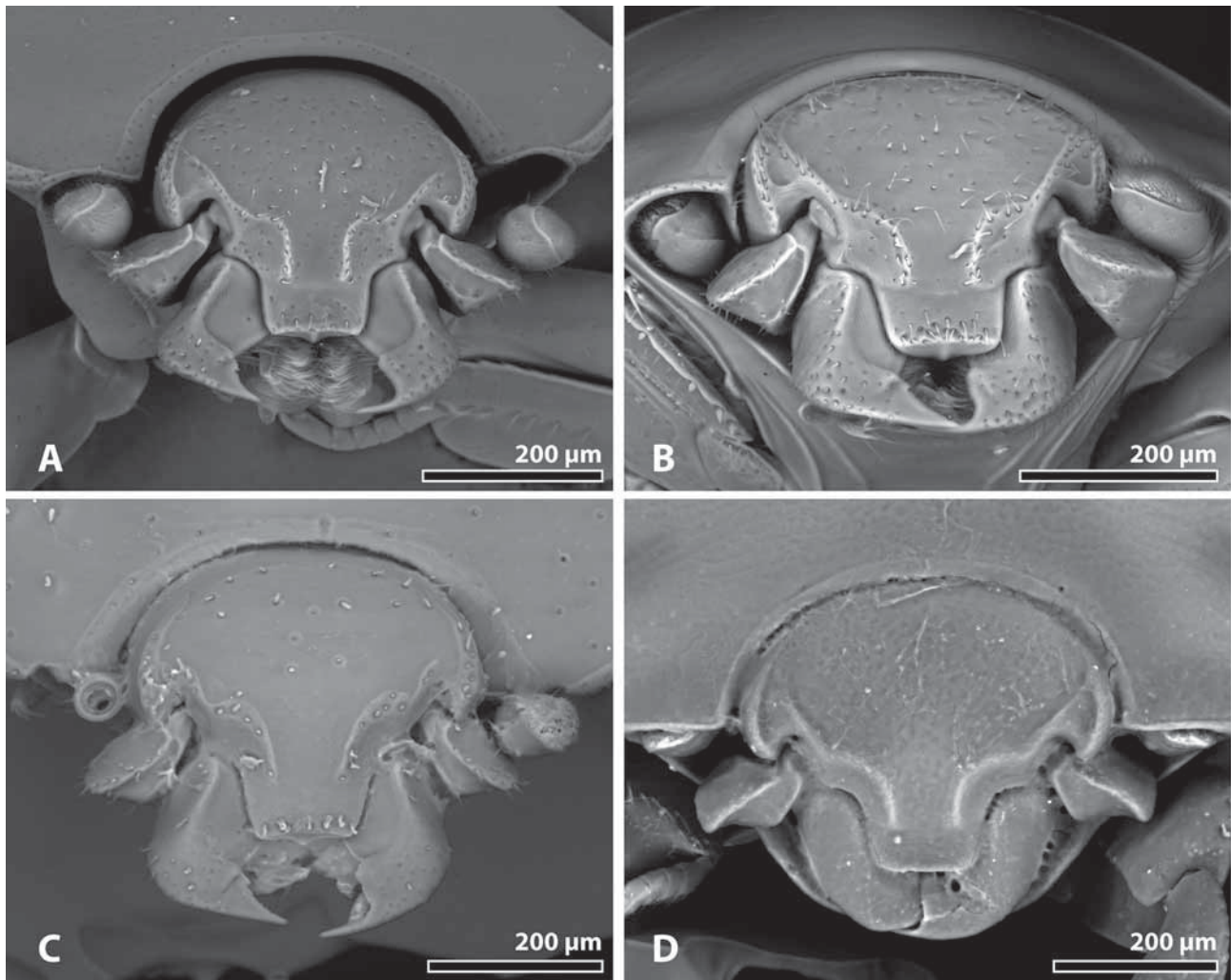


FIGURE 7. Anterior SEM photographs showing frons. A. *Hippeutister californicus*. B. *H. solisi*, C. *H. castaneus*. D. *H. manicatus*.

***Hippeutister amabilis* (Wenzel, 1938)**
(Fig. 1E)

Solenopsister amabilis Wenzel, 1938: 318; Blackwelder, 1944: 186.

Diagnosis: L: 1.5mm; W: 1.25mm (measurements from Wenzel, 1938). Wenzel initially described this species in its own monotypic genus, having been unaware of Reichensperger's then recent description of two species of *Hippeutister*. Thus he offered no putatively diagnostic species level characters. Based on his description and illustrations the species is clearly correctly placed in *Hippeutister*. Like only *H. manicatus* and *H. plaumanni*, it is evidently completely glabrous, and it seems very similar to the latter in general, showing a

distinct sutural row of enlarged punctures. However, Wenzel's figures suggest this species is more densely punctate than *H. plaumanni* or any of the others of the genus.

Distribution: This species has been reported only from the type locality, Cordoba, Veracruz, Mexico where it was collected with *Solenopsis xyloni* McCook (Wenzel, 1938).

Remarks: Unfortunately the type of this species appears lost. Having initially been collected by Charles Seevers and then described by Rupert Wenzel, both Field Museum (Chicago, IL) associates, that seems the only likely repository, although Wenzel did not specify it in his description. However, it has not been found there.

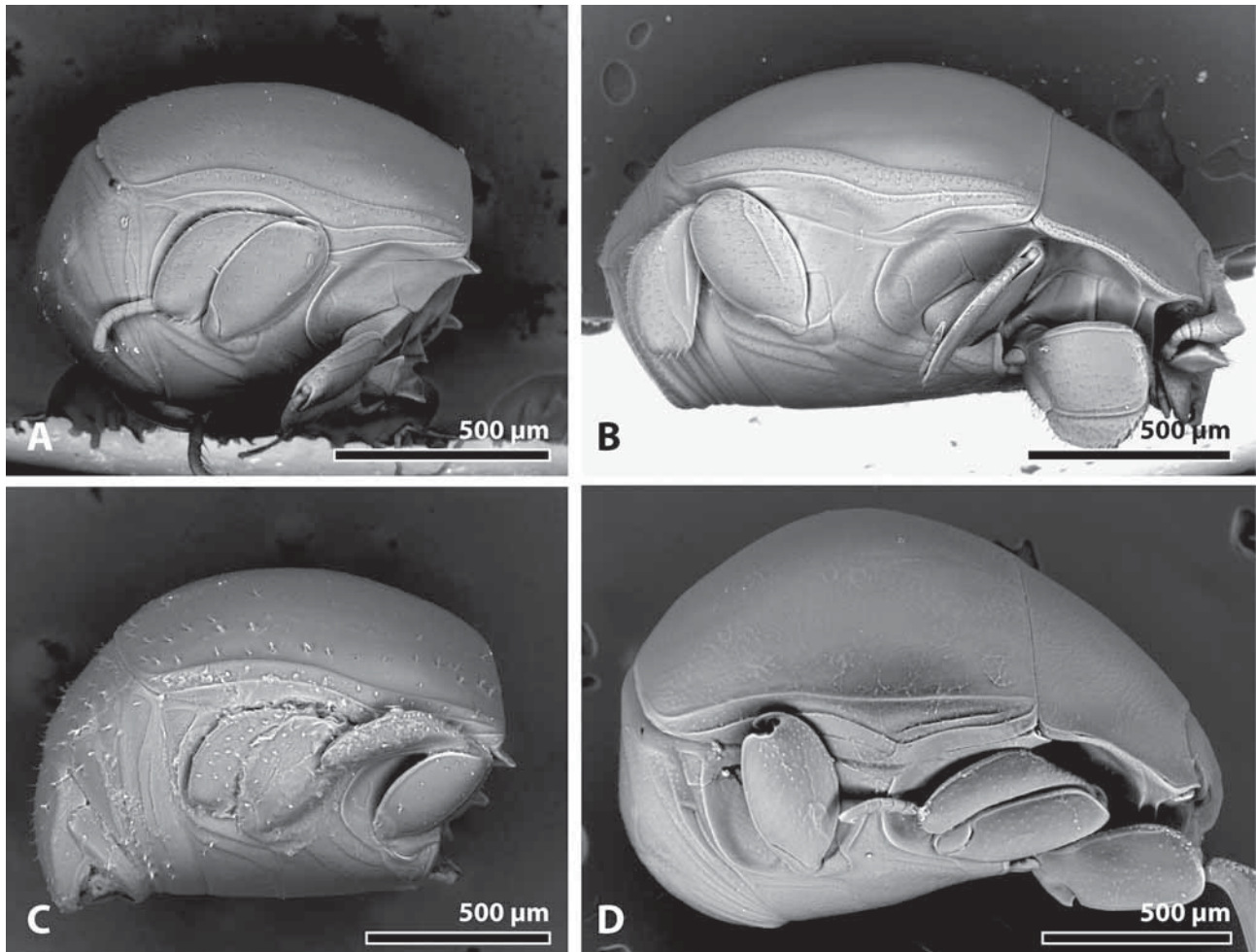


FIGURE 8. Lateral SEM photographs. A. *Hippeutister californicus*. B. *H. solisi*, C. *H. castaneus*. D. *H. manicatus*.

Discussion

This review was inspired by the discovery during fieldwork associated with the California Beetle Project (Caterino 2006) of an apparently undescribed species of myrmecophilous beetle belonging to this genus never reported north of Mexico. In the course of this study, two species were described as new, one name was synonymized, an identification key for the species was produced and available life history information for the genus was summarized. These results may serve as an example of the impact biotic inventories may and should have on taxonomic studies.

Despite this progress in *Hippeutister* taxonomy, resolution of its relationships within Hetaeriinae remains elusive. Currently, the genus is classified in the tribe Hetaeriini, an artificial assemblage of numerous, often

distantly related genera of Hetaeriinae, within Helava *et al.*'s (1985) informal Group D (Tishechkin 2007). This placement (rather than in Group E, as Helava *et al.* initially proposed) is a result of morphological phylogenetic analysis of Helava *et al.*'s Group E (corresponding now, with slight modifications, to the tribe Nymphisterini; Tishechkin 2007), placing *Hippeutister* consistently outside this group, along with some other Group D representatives (Tishechkin 2007). Due to limited Group D sampling, however, these results did not contribute much to the understanding of the relationships of *Hippeutister* with other hetaerine genera. Recent re-description of *Plagioscelis* Bickhardt, the genus suggested by Helava *et al.* (1985) to be most closely related to it, revealed substantial differences between these genera in external morphological and male genitalic characters (Dégallier 1998b). Limited molecular phylogenetic information available (Caterino and Tishechkin, unpublished) also points towards an isolated position of *Hippeutister*, somewhere near the base of the hetaerine tree.

Currently available host information supports *Hippeutister* as a specialized guest of *Solenopsis* fire ants. Multiple independent records are available for four host ant species, *S. amblychila* Wheeler, *S. geminata* (Fabricius), *S. saevissima* (Smith) and *S. xyloni*. The latter two species seem somewhat doubtful as hosts of *Hippeutister* in light of their currently recognized distributions (summarized in Tschinkel 2006); none of the reported *Hippeutister* localities (Nova Teutonia, Santa Catarina [Brazil], and Cordoba, Veracruz [Mexico]) lie within their known ranges. Given available host distributional information, the likely host of *H. amabilis* is *S. geminata* and for *H. plaumanni* either *S. megergates* Trager or *S. richteri* Forel.

The known distribution of *Hippeutister* appears to be widely disjunct, with four species known in Central and North America, from California to Costa Rica, and one species known from a single locality in southern Brazil. Given the specificity of the *Hippeutister* – *Solenopsis* symbiosis and distribution and diversity of the New World fire ants, we predict that known *Hippeutister* diversity is incomplete. Further sampling across the ranges of 22 New World *Solenopsis* species would likely lead to the discovery of additional species of *Hippeutister*, especially in such areas as northern Argentina, Bolivia, central and southern Brazil, and Paraguay, where the bulk of neotropical *Solenopsis* diversity occurs (Tschinkel 2006). Such discoveries would apparently necessitate sampling in ant colonies, since the productive passive method of Hetaeriinae collecting with flight intercept traps (Peck and Davies 1980) has not proven effective for collecting *Hippeutister*. Only a single specimen, *H. castaneus* in Belize, was collected by this method, despite an extensive flight intercept collecting effort in the Neotropics in the 1980–2000s (Tishechkin 2003, 2007). We hope that by calling attention to this unusual host relationship, additional work on *Hippeutister* may be inspired.

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References

- Blackwelder, R.E. (1944) Checklist of the Coleopterous Insects of Mexico, Central America, the West Indies, and South America. *Bulletin of the USNM*, 185(1–6), 1–1492.
- Bruch, C. (1926) Nuevos histéricidos ecitófilos (Col.). *Revista del Museo de La Plata*, 29, 17–33.

- Caterino, M.S. (2006) California beetle faunistics: 100 years after Fall. *Coleopterists Bulletin*, 60, 177–191.
- Dégallier, N. (1998a) Coleoptera Histeridae Hetaeriinae: description de nouveaux taxons, désignation de lectotypes et notes taxonomiques. *Bonner Zoologische Beiträge*, 47, 345–379.
- Dégallier, N. (1998b) Notes taxonomiques sur les Coleoptera Histeridae Hetaeriinae du Muséum d'Histoire Naturelle de Berlin (MNHUB). *Mitteilungen aus dem Museum für Naturkunde in Berlin*, 74, 129–143.
- Helava, J.V.T., Howden, H.F. & Ritchie, A.J. (1985) A review of the new world genera of the myrmecophilous and termitophilous subfamily Hetaeriinae (Coleoptera: Histeridae). *Sociobiology*, 10(2), 127–386.
- Lewis, G. (1891) On new species of Histeridae. *Annals and Magazine of Natural History*, (6) 8, 380–405.
- Mazur, S. (1997) A World Catalogue of the Histeridae. *Genus, International Journal of Invertebrate Taxonomy (Supplement)*, 1997, 1–373.
- Peck, S.B. & Davies, A.E. (1980) Collecting small beetles with large area “window” traps. *Coleopterists Bulletin*, 34, 237–239.
- Reichensperger, A. (1935) Beitrag zur Kenntnis der Myrmekophilenfauna Brasiliens und Costa Ricas III. (Col. Staphyl. Hist.). *Arbeiten über Morphologische und Taxonomische Entomologie aus Berlin-Dahlem*, 2, 188–218.
- Reichensperger, A. (1936) Beitrag zur Kenntnis der Myrmekophilen- und Termitophilenfauna Brasiliens und Costa Ricas. IV. (Col. Hist. Staphyl. Pseplaph.). *Revista de Entomologia*, 6, 222–242.
- Tishechkin, A.K. (2003) New distributional records of Neotropical Hetaeriinae (Coleoptera: Histeridae). *Sociobiology*, 41, 673–683.
- Tishechkin, A.K. (2007) Phylogenetic revision of the genus *Mesynodites* Reichardt, 1924 (Coleoptera: Histeridae: Hetaeriinae) with description of new tribes, genera and species. *Sociobiology*, 47, 1–167.
- Tschinkel, W.R. (2006) *The fire ants*. Belknap Press of Harvard Univ. Press, Cambridge, London.
- Wenzel, R.L. (1938) New and little known Neotropical Hetaeriomorphini (Coleoptera: Histeridae). *Revista de Entomologia*, 9, 317–321.